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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/660,483

09/12/2003

Koji Mishima

2003\_1305

6334

513

7590

09/22/2006

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WASHINGTON, DC 20006-1021

EXAMINER

LEADER, WILLIAM T

ART UNIT

PAPER NUMBER

1742

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/660,483

**Applicant(s)**

MISHIMA ET AL.

**Examiner**

William T. Leader

**Art Unit**

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 7-9, 13 and 14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7-9, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Receipt of the papers filed on June 27, 2006. The translation of the certified copy of foreign priority document has been received and perfects the claim of foreign priority. As indicated in applicant's Remarks, the Hymes patent, which was filed after the filing date of applicant's priority document, no longer qualifies as prior art. The rejections based on Hymes are withdrawn and the following rejections made.

#### ***Claim Rejections - 35 USC § 103***

2. Claims 7-9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reid et al (6,716,334) in view of Landau (6,261,433) and further in view of Hongo et al (6,294,059).
3. The Reid et al patent is directed to a method and apparatus for electroplating a metal onto a semiconductor wafer. The plating metal may be copper (column 2, lines 51-54). Reid et al teach that in conventional plating, the wafer is processed serially through three separate stages: pre-treatment, plating and rinsing (column 1, lines 11-15). Reid et al disclose an apparatus in which multiple operations may be performed. These operations include spraying pure water onto the wafer. Reid et al recognize that it is undesirable for excess water to enter the plating solution because the solution would be diluted (column 1, lines 29-34). The apparatus of Reid et al is designed so that the wafer may be spun while water is sprayed onto the wafer. During the spraying, the wafer may be positioned so that the water spun from the wafer is collected separately and does not dilute the plating bath (column 3, lines 32-60).

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4. Instant claim 7 differs from the process of Reid et al by reciting bringing the substrate into contact with a processing liquid offering increased wettability between the plating solution and the substrate surface. As noted above, Reid et al discloses pretreatment prior to plating, but does not describe the pretreatment in detail.

5. The Landau patent is directed to electroplating a metal onto semiconductor wafers. Landau teaches that prior to plating, ultra pure water can be introduced to the substrate plating surface to ensure complete wetting which enhances the electroplating process (column 18, lines 35-39). Landau also notes that surfactants improve wetting by reducing surface tension (column 18, lines 40-41).

6. Claim 7 additionally differs by reciting separate processing units arranged in the same horizontal plane. The Hongo et al patent is directed to a substrate a plating apparatus which includes multiple processing units. The figures include plan views and cross sectional views of the apparatus. See figures 3, 5, 6, 7, 11, 12, 13, 14 and 15. These figures show that processing units may be positioned in the same horizontal plane.

7. It would have been obvious to have utilized the wetting treatment disclosed by Landau as the pretreatment in the process of Reid et al because complete wetting of the substrate plating surface with the plating solution would have been obtained. By teaching that dilution of the plating solution should be avoided, Reid et al suggest the removal of excess wetting liquid from the substrate surface after pretreatment and prior to plating. As noted above, Reid et al teaches removing liquid from the wafer by spinning the wafer. This meets the limitation of instant claim

8. Additionally it would have been obvious to have provided the treatments in separate units

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arranged horizontally as shown by Hongo because such an arrangement allows efficient processing of wafers. The apparatus of Reid et al is adapted to performing multiple process steps, meeting the limitation of instant claim 9.

8. With respect to claim 14, Landau teaches that surfactants are both organic substances and compounds which may contain sulfur. See column 18, lines 38-52.

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reid et al (6,716,334) in view of Landau (6,261,433) and further in view of Hongo et al (6,294,059) as applied to claims 7-9 above, and additionally in view of Yamakawa et al (4,906,341).

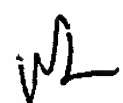
10. The Yamakawa et al patent is directed to a process for electroplating a semiconductor workpiece. Yamakawa et al teach that bubbles may form on the surface of the semiconductor. To ensure more complete contact, the plating solution is preferably applied a plurality of times. See column 3, lines 36-64. The contacting of any of the processing solutions in the process suggested by Reid et al a plurality of time would have been obvious because more complete contact would have been ensured as taught by Yamakawa et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William T. Leader whose telephone number is 571-272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



William Leader  
September 13, 2006



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